SUMMARY OF THE 2002 POST CALVING SURVEY FOR THE ITCHA -ILGACHUZ CARIBOU HERD, CARIBOO REGION

Prepared by

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ABSTRACT

As part of ongoing monitoring, the Itcha-Ilgachuz Mountains caribou herd was surveyed aerially in an effort to determine population trends, sex ratios, and calf recruitment. The post calving survey completed on June 20 and 21, 2002 observed a total of 2862 caribou; 1344 cows, 743 calves, 629 bulls, 12 yearling cows, 30 yearling bulls, 26 unsexed adults and 78 unsexed yearlings. The observed percent calves was 26.0% in the Itcha-Ilgachuz Herd. The Itcha-Ilgachuz Herd appears to have a long term *increasing* trend, with adequate calf recruitment and an increasing bull to cow ratio: the estimated post-season population is 2500 caribou with a density of 0.25 caribou/km^2. Periodic monitoring coupled with population modelling will be necessary to confidently implement a long-term caribou strategy as required by the Cariboo-Chilcotin Land Use Plan (CCLUP).

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INTRODUCTION

There are presently five caribou (*Rangifer tarandus caribou*) herds within west-central British Columbia (Figure 1). Caribou from the Itcha-Ilgachuz Mountains Herd, Rainbow Mountains Herd and Charlotte Alplands Herd share a common winter range in some years, thus for management purposes they are considered three herds of the same meta-population (Thomas and Gray, 2001). In this report the term herd is synonymous with a single geographic population or local population (Thomas and Gray, 2001).

An aerial caribou population survey was completed in June 2002 throughout the Itcha and Ilgachuz Mountains and adjacent wetlands. The post calving survey provides a measure of total numbers and the relative abundance of the breeding female component and early calf production within the Itcha-Ilgachuz Herd. Previous rut surveys have estimated caribou sex composition and summer calf survival while late winter surveys have compared the proportion of forest and alpine-dwelling cows with calves as well as overall calf recruitment. Observations of radio-collared caribou provided a sightability index of cows for the post calving survey. Periodic surveys of the same area in combination with previous data will provide quantifiable population trends to aid wildlife managers.

This survey contributes to developing a long-term regional caribou strategy as outlined in the Cariboo-Chilcotin Land Use Plan (CCLUP). Planned timber harvesting in mature pine forest surrounding the Itcha-Ilgachuz Mountains will significantly decrease the available terrestrial and arboreal lichens foraged upon by caribou in winter months. Reduced winter habitat may impact the abundance and composition of the caribou population; therefore, population monitoring is required to provide a benchmark, as planned logging continues to expand throughout much of their range.

We wish to acknowledge Chris Schmid and Trevor Andrews for serving as observers during the surveys. Thanks are extended to Debbie Cichowski for permission to use her unpublished population survey data from the mid-1980's, Ian Hatter for his statistical advice, and Jennifer Ballentine for producing Figure 1 and the maps for the report. Project funding was provided by Columbia Basin Fish and Wildlife Compensation Program.

SURVEY AREA

The Itcha and Ilgachuz Mountain Ranges are situated in a plateau region of mature lodgepole pine (*Pinus contorta*) forest interspersed with wetlands and meadows within Management Unit 5-12 of the Cariboo Region (Figure 1). Once active volcanoes, the mountains now contain gently rolling alpine areas chosen by caribou for calving and rutting. All alpine areas are protected as the Itcha and Ilgachuz Mountain Ranges now lie within the newly protected Itcha-Ilgachuz Provincial Park. The survey area is within the Western Chilcotin Uplands Ecosection and is characterized by two biogeoclimatic zones at the higher elevations; the Alpine Tundra zone and the Engelmann Spruce Subalpine Fir, very dry, very cold sub-zone. The total area known to be inhabited by the Itcha-Ilgachuz caribou herd is approximately 10,042 km^2.

METHODS

Aerial surveys were completed in a Bell 206 Jet Ranger utilising the total count technique for absolute abundance survey methods (Resource Information Standards Committee, 2002). The surveys were restricted to high strata habitats where, under the proper conditions, animal sightability is high. This included the Itcha Flats wetland complex, alpine and adjacent parkland habitat and the larger wetlands between the Itcha and Ilgachuz Mountains. Mountain complexes were flown in a counter clockwise manner to allow observers on the left side of the aircraft to scan the open habitat for caribou. The observer in the back right-hand seat provided additional coverage when necessary, particularly in the flatter terrain. Several of the wider ridges required more than one pass for complete visual coverage. Radio-collared caribou not observed during the systematic survey were subsequently searched out and recorded separately. In this way, caribou numbers visually observed each year could be compared directly, and data collected from all radio-collared caribou could still be gathered and used for separate purposes.

The post calving survey flights on June 20 and 21 included Pat Dielman (navigator), Chris Schmid, Trevor Andrews and pilot Tom Arduini. Clear sunny conditions with unlimited visibility prevailed for the greater part of the survey; 10% cloud cover and a light smoke haze was observed during the second day of the survey. Flight time totalled 12.4 hours. Caribou were classified into the following categories; cow, calf, yearling cow, bull, yearling bull, unsexed adult and unsexed yearling. UTM coordinates were recorded for each group of animals to digitally produce flight maps. Yearlings were not included in calculations of post calving bull/cows ratios.

Estimates of cow caribou abundance were derived using the Joint Hypergeometric Maximum Likelihood Estimator (JHE) and the NOREMARK computer statistical package by Gary White (1996). The JHE is an extension of the Peterson Method (White & Garrot 1990) used in previous population reports and is now the Resource Information

Standards Committee (RISC, 2002) principle method for mark-resight estimates in closed populations with only one sighting occasion. A sighting occasion is an attempt to view animals in a population, keeping track of the number of marked and unmarked animals observed. This model assumes that individual marked animals have the same probability of sighting as every other individual within the population on a given occasion.

The joint maximum likelihood estimator of mark-resight is the value of N that maximizes the likelihood:

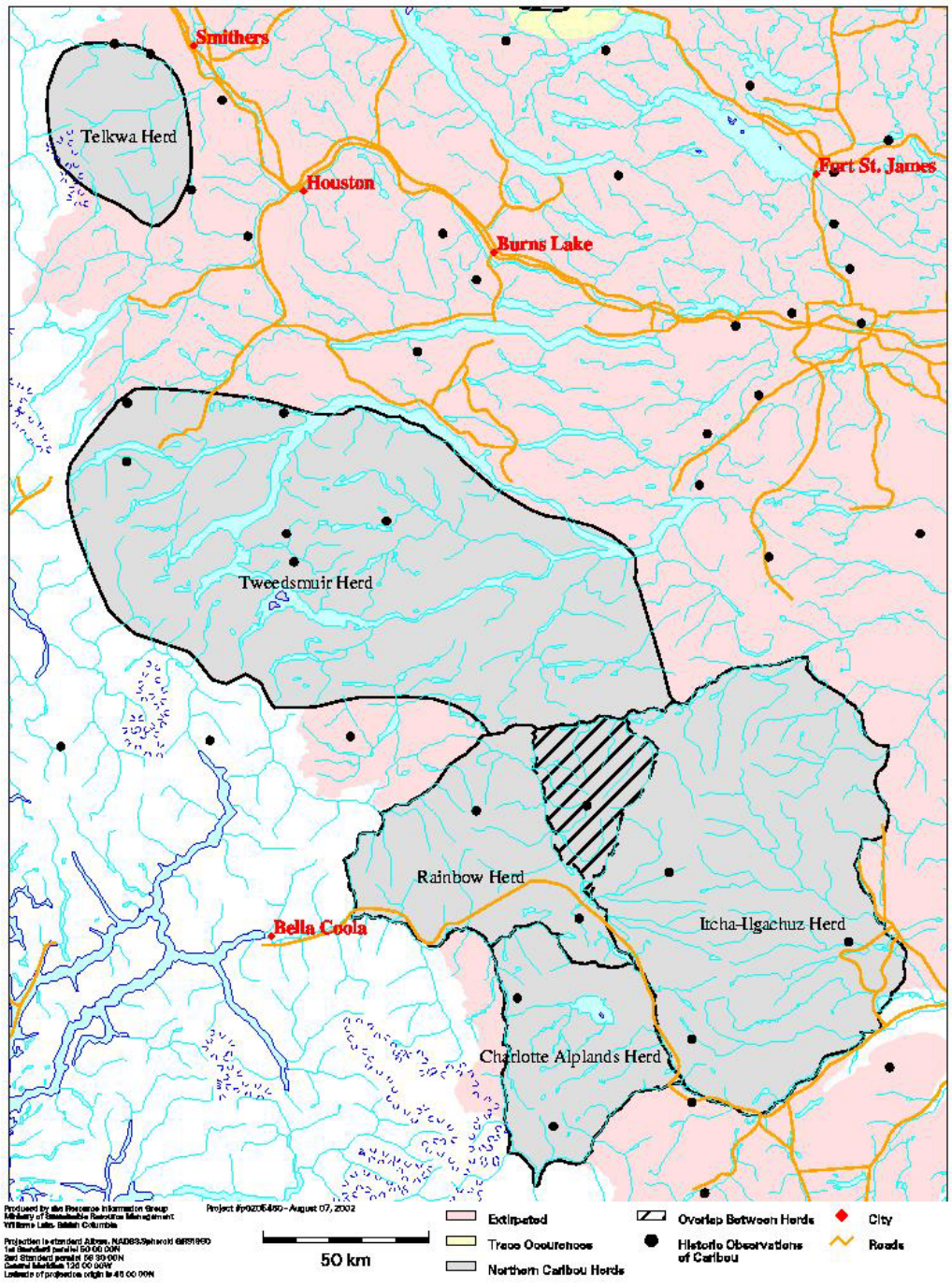
$$£(N \mid M, n_i, m_i) = \prod_{i=2}^{k+1} \frac{(M/m_i) \times [(N-M)/(n_i-m_i)]}{(N/n_i)}$$

Where n_i and m_i are the total number of animals observed and the number of marked animals observed, respectively, on sighting occasion i, i=2, . . ., k+1. The number of available marked animals located within the survey area at the time of the i^{th} sighting, are defined as M. Computerised optimization is required to find N, the estimated population size. The 95% confidence interval is constructed directly from the likelihood. As such, estimates of the lower and upper confidence bounds are the values of N that produce values of the log likelihood which are 2 units less than the value of the log likelihood at the maximum (White & Garrot 1990). With this type of confidence interval the lower confidence bound is never estimated at a value less than the minimum number of animals known to exist. Methods utilized in this report reflect our current understanding of the most appropriate techniques for data analysis.

The following attributes, adapted from Simpson et al. (1993), were used to classify individual animals:

Bulls:	antlers larger than females, heavy beamed antlers
	antlers often have many points and palmated brow tine
	body size
	testicles or penis sheath
	lack of vulva patch
Cows:	small antlers
	black vulva patch
	presence of calf or yearling
	short face for yearlings
Calf:	body size
	dark bodies
	lack of antler development
	proximity to adults

Figure 1. Caribou Herds in West-Central British Columbia.



RESULTS

Post Calving Survey
A total of 2862 caribou were observed on the June 20 and 21 flights; 1344 cows, 743 calves, 12 yearling cows, 30 yearling bulls, 78 unsexed yearlings, 26 unsexed adults, and 629 bulls (Table 1, Appendix 1 and 2). At the completion of the survey the following ratios were calculated: 55.3 calves/100 cows, 46.8 bulls/100 cows and 6.0 yearlings/100 adult caribou.

During the survey 84 mountain goats were observed: 68 goats in the Ilgachuz Mountains and 16 goats in the Itcha Mountains, along with three California bighorn sheep in the Ilgachuz Range (Appendix 3).

Table 1. Caribou Observed June 20th and 21st, 2002 within the Itcha and Ilgachuz Mountains.

Mountain Range	Total Caribou	Cows (>1yrs)	Calves	Bulls (>1yrs)	Yrlg. Cows	Yrlg. Bulls	Unsexed Yrlgs.	Unsexed Adults
Itcha	1178	459	252	386	12	14	44	11
Ilgachuz	1684	885	491	243	0	16	34	15
Total	2862	1344	743	629	12	30	78	26

Survey Costs
A pre-survey fixed-wing flight on June 19th, to determine the location of radio-collared caribou, cost $1,463.45 and required 5.6 hours. Helicopter rental costs totalled $10,543.12 (or 12.4 helicopter hours) for the survey. Environmental Stewardship staff committed approximately 12 person days for pre-planning, surveys and report completion.

DISCUSSION

More caribou were observed in this year's post calving survey (2,862) of the Itcha-Ilgachuz Mountains Herd than in previous years and numbers continue to appear to be increasing (Appendix 4). In 1995 a total of 1,321 caribou were observed, 2,121 caribou were counted in 1998 and 2,167 caribou in 2000 (Loveridge and Young, 1997, Young and Roorda, 1999 and Young and Freeman, 2001). The Itcha-Ilgachuz 2002 June percentage calves value of 26.0% was about average compared to other recent surveys. Post-calving surveys indicate that the Itcha-Ilgachuz Herd remained relatively stable during the late 1980's and early 1990's (Figure 2) at about 1,500 animals**.** There appears to have been a substantial increase in caribou numbers since 1996, likely due to actual increases and better overall sightability due to more thorough search effort.

The survey resulted in a low number of yearling caribou being classified; 120 animals or 6.0 yearlings/100 adults. A survey in March 2002 observed 21.8 calves/100 adults suggesting the June survey estimate is biased low. Observers had difficulty differentiating yearlings from adults, particularly within the larger groups where minimizing stress to the animals became a concern due to the length of time required to classify all animals. As a result, bull and cow numbers are likely biased high and yearling numbers low for the survey.

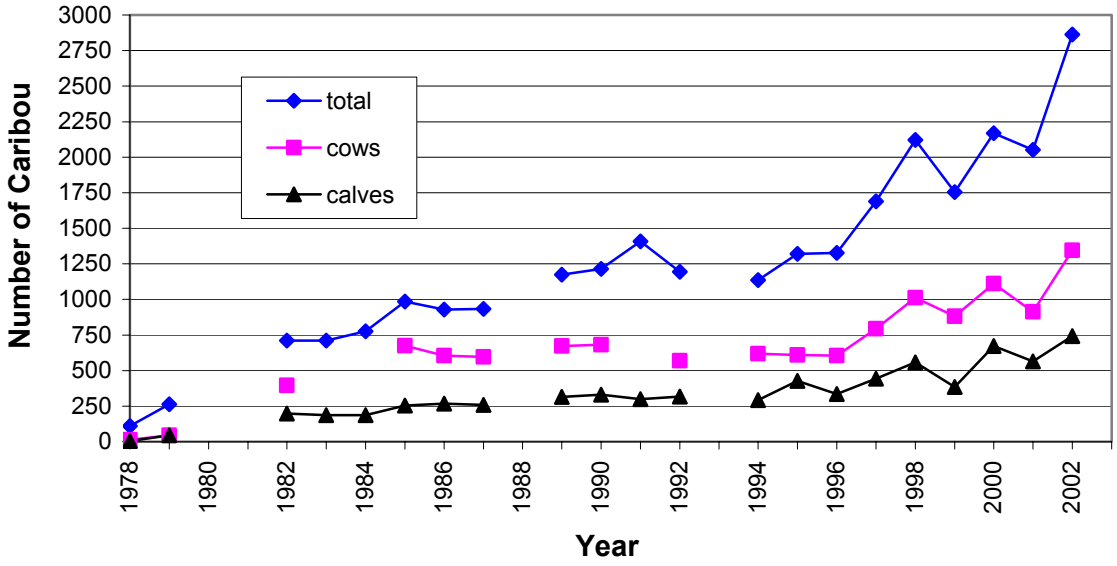


Figure 2. Summary of caribou post calving surveys for the Itcha-Ilgachuz Mountains Herd.

Surveys have observed healthy calf production, a stable breeding female component and a relatively stable bull/100 cow ratio. Between 1995 and 1999 post calving surveys observed bull/cow ratios ranging between 31 and 33 bulls/100 cows, with the exception of 1997 which had a ratio of 25.6 bulls/100 cows. In 2000, a ratio of 23.9 bulls/100 cows was observed. A record high of 46.8 bulls/ 100 cows was observed in the June 2002 survey. The high values obtained in 2002 were likely a result of a combination of factors; the difficulty in classifying bull yearlings likely resulted in some animals being incorrectly classified as bulls and the thorough search of wetlands adjacent to the alpine and between the two ranges likely resulted in more animals being observed that in historic surveys. All years surveyed, with the exception of 2002 and 1992 (38.5 bulls/100 cows) were below the provincial target of 35 bulls/100 cows for post season estimates (Figure 3).

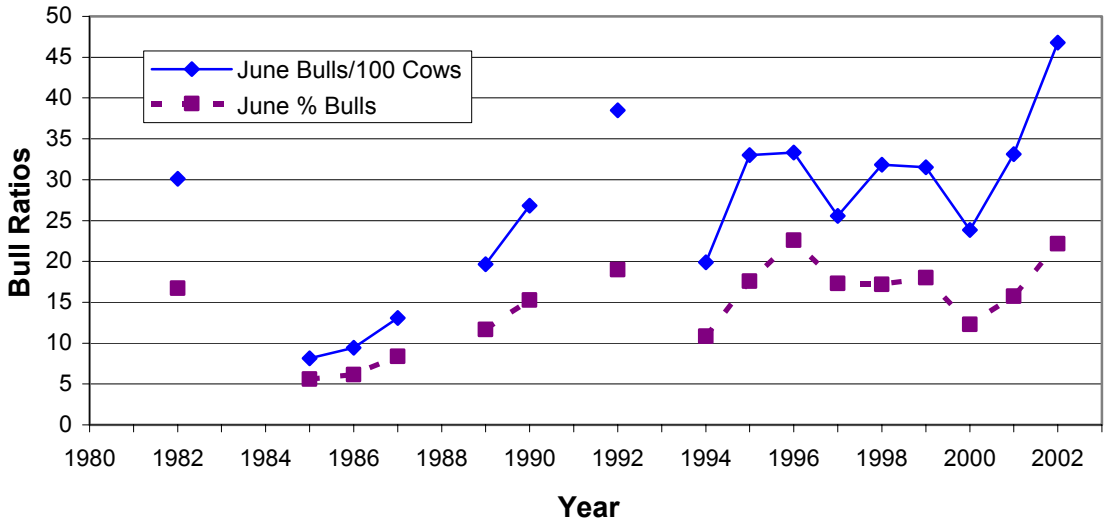


Figure 3. Summary of post-calving bull ratios for the Itcha-Ilgachuz Mountains Herd for all years (1984 and 1991 omitted due to many unclassified animals and small sample size, respectively).

Bergerud (1978) counted 310 caribou in the Itcha and Ilgachuz Mountains in 1973, and suggested there was a maximum of 400 animals in the herd during the mid 1970's. During the late 1970's and early 1980's, surveys undertaken by regional wildlife staff observed a dramatic increase in caribou numbers (Smith and Hebert 1986). Based on the results of this survey, the Itcha-Ilgachuz Herd is estimated at 2500 animals (post hunting season) with a density of 0.25 caribou/km^2.

Based on trend definitions adapted from Thomas and Gray (2001) the Itcha-Ilgachuz Herd has a long term (3 generations or 20 years) trend of *increasing*; herd estimates have gone from approximately 795 caribou in 1982 to 2,500 caribou in 2002. The short term trend (1 generation or 7 years) is *growing* as a result of estimates changing from 1,500 animals in 1995 to 2,500 animals in 2002; a current trend (over last 2 years) of *up* is based on the current estimate increasing from 2,000 caribou. The reliability of all three population trend indicators is considered high due to the consistency and frequency of surveys. The exponential ceiling trend provides a long term rate of increase (λ) of 1.06 (Figure 4).

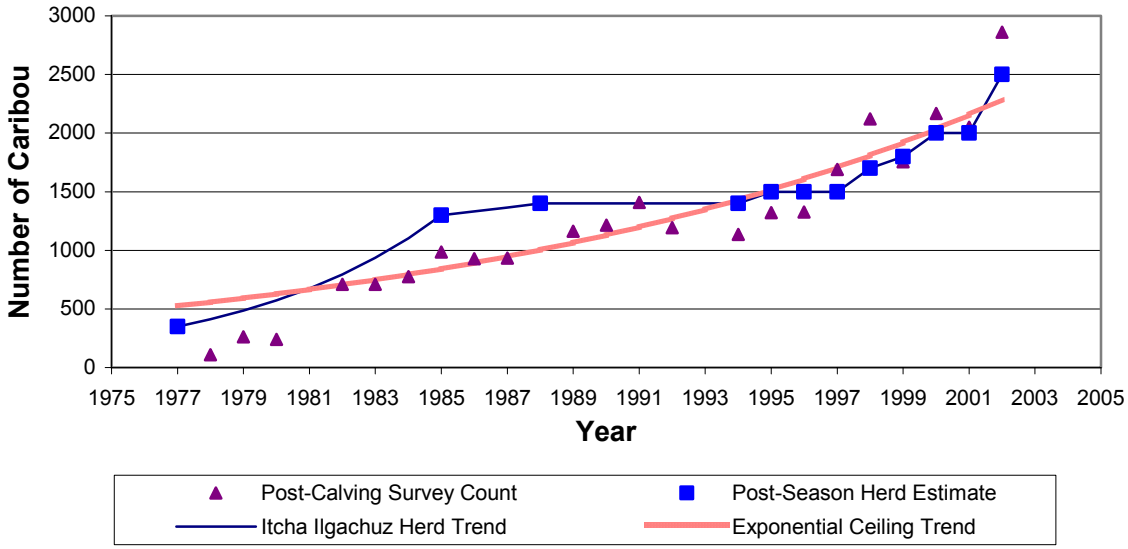


Figure 4. Population estimates and trends for the Itcha-Ilgachuz Caribou Herd, 1977-2002. Post-season herd estimates for 1977 and 1985 from Smith and Hebert (1986) and for 1988 from Cichowski (1988).

Sightability corrections were made to the survey data from 1985-1987 and 1996-2002 to estimate total cow numbers in June within the Itcha-Ilgachuz Herd (Figure 5, Appendix 5). Data from the 1980's included yearlings in the cow count and, therefore, overestimated the female breeding population. The 1996-2002 estimates included cows two years and older and excluded bulls, yearlings, and calves. Although these differences make it difficult to directly compare the data between the late 1980's and the 1990's, it indicates the same generally stable to increasing population trend as found in Figure 2.

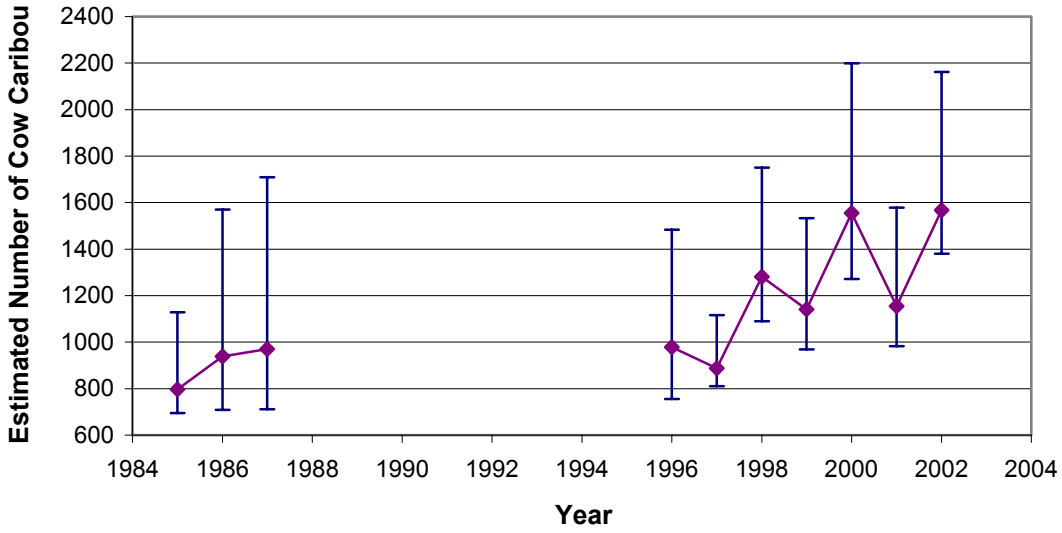


Figure 5. Estimated number of cow caribou in the Itcha-Ilgachuz Herd, post calving, and 95% confidence limits using collared animals to correct for sightability. Estimates in the

1980's included cows and yearlings, while 1996-2002 data included only cows (1985-87 estimates; Cichowski unpubl. data).

Aggregation of caribou in late spring and early summer may introduce bias into the population estimate derived from the post-calving survey results. When sighting probability is a function of group size, such that larger groups of caribou have a greater probability of being sighted than smaller groups, bias of the estimate may occur as a result of violating the assumption of independent observations (Neal et al. 1993, Samuel et al. 1987). The potential for overestimation increases with aggregation; however, Neal et al. showed that relative confidence interval length did not change regardless of whether animals grouped or whether increasing group size increased the probability of being observed.

The annual migration to the alpine spring calving grounds is thought to be an anti-predator strategy by caribou to distance themselves from predators. By distancing themselves from other prey types, predator search time is increased making it less energetically favourable to subsist on a diet of caribou. Cows and calves are the most vulnerable segments of the population during calving and therefore tend to seek out the highest elevations. Bulls are often the last to migrate, choosing instead to feed on higher quality forage found at lower elevations. As a result, the timing of the survey as well as spring weather conditions that effect green-up conditions can affect the sightability of the male component of the herd.

In the mid 1980's greater numbers of bulls were observed during rut surveys than post-calving surveys within the Itcha-Ilgachuz Herd, however overall numbers seen during surveys have roughly doubled since that period. Although bull numbers have been fairly consistent in recent years, October results have shown the herd below the provincial target of 35 bulls/100 cows post season during most surveys. The fact that recent post calving bull/cow ratios were substantially higher and the harvest has been relatively low suggests some sightability bias during the rut surveys. Post calving surveys observe more of the population and appear to provide a better estimate of sex ratios.

CONCLUSIONS

- During the 2002 June post calving survey a total of 2,862 caribou were observed which included 1,344 cows, 743 calves, 629 bulls, 12 yearling cows, 30 yearling bulls, 26 unsexed adults, and 78 unsexed yearlings. The observed calf/100 cow ratio was 55.3/100 in the Itcha-Ilgachuz Herd.

- Population estimates for the Itcha-Ilgachuz caribou population provide a current trend of *up*, a short term trend of *growing* and a long term trend of *increasing*.

- The Itcha-Ilgachuz post calving bull/100 cow ratio appears to be above the provincial target of 35 bulls/100 cows.

RECOMMENDATIONS

- Future survey efforts should continue with at least post-calving and late winter surveys; the former provides the best measure of total numbers along with useful bull/cow ratios and the latter survey provides a valuable estimate of annual calf recruitment.

- Surveys should be undertaken every year when radio-collared animals are present. This will allow for development of a sightability correction factor and monitoring of calf survival amongst collared females within the population.

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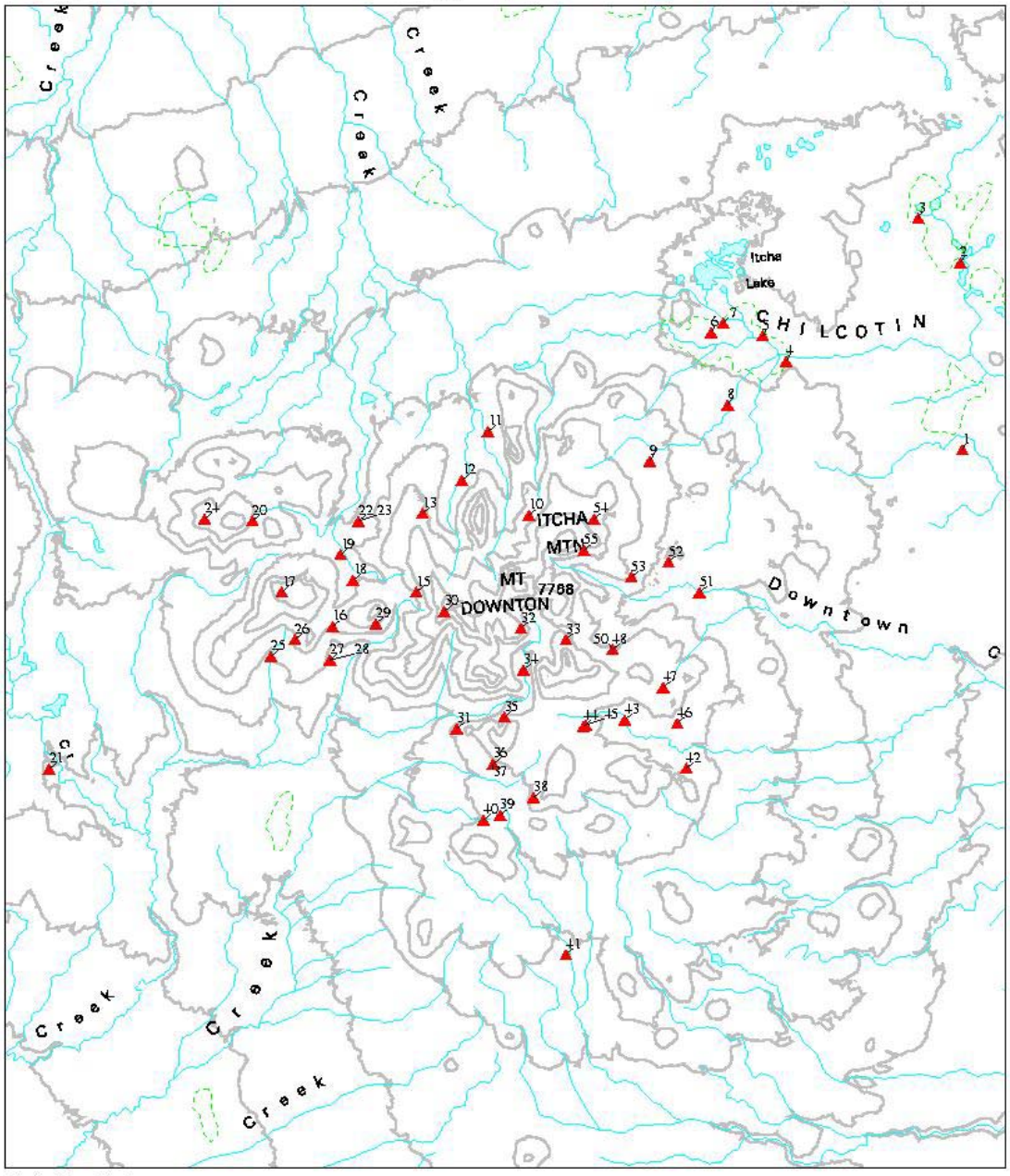
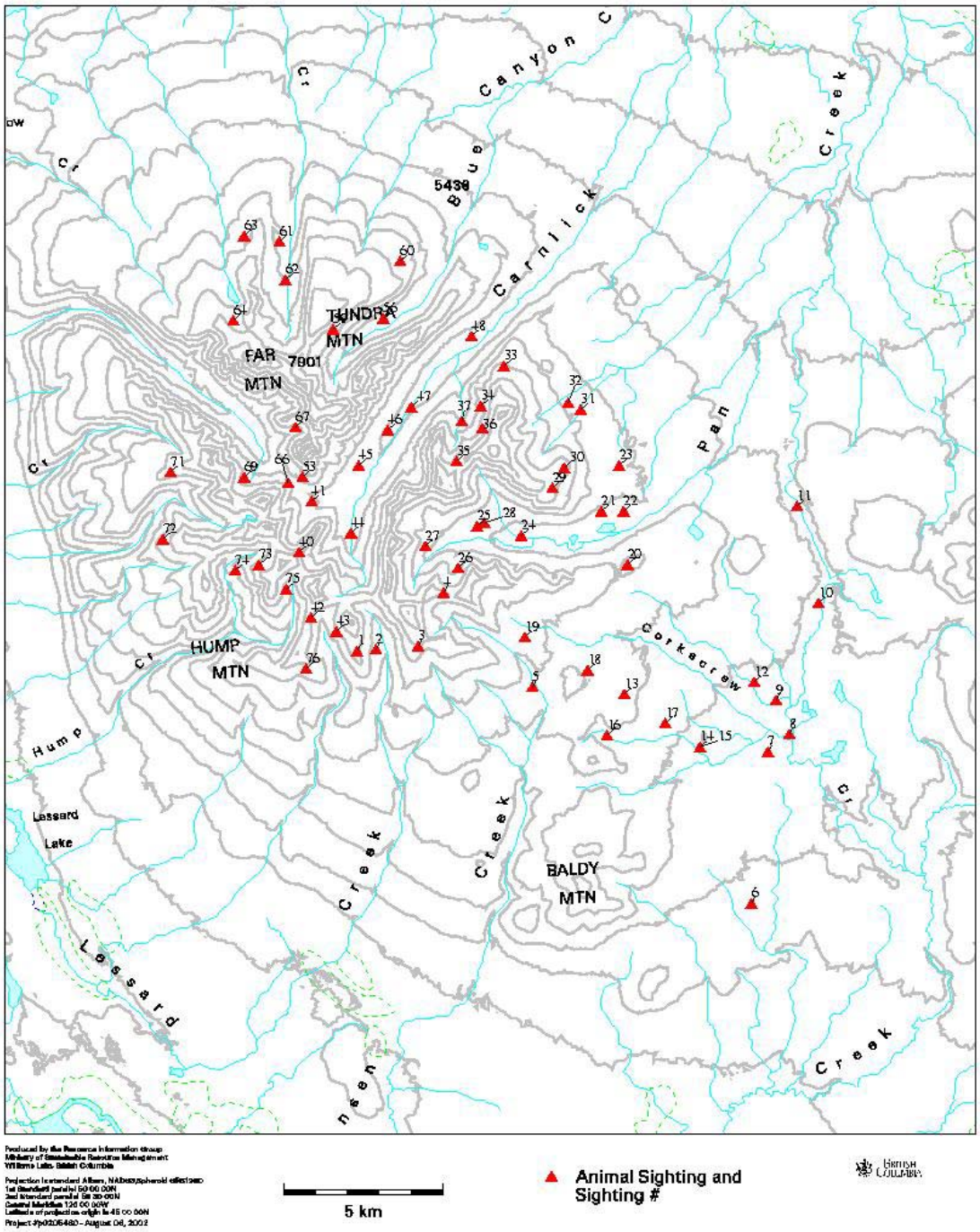
APPENDICES

Appendix 1. Mapped locations of Caribou observed on June 20th and 21st, 2002.

Map 1: Locations of caribou groups observed on June 20th, 2002



Map 2: Locations of caribou groups observed on June 21st, 2002



Appendix 2. Caribou observations during Post-Calving Survey, June 20th and 21st, 2002.

ITCHA MOUNTAINS CARIBOU SURVEY - JUNE 20, 2002

Sighting	Easting	Northing	Total	Cows	Calves	Bulls	Yrlg. Cows	Yrlg. Bulls	Unclass. Adults	Unclass. Yrlg.
1			3			3				
2			53			50	1	2		
3			4			2	1	1		
4			76			71				5
5			5			5				
6			45			41	1			3
7			13			10	1	2		
8			11			11				
9			32			27	2			3
10			219	135	84					
11			65	1		53				11
12			3			3				
13			25	3	1	18	1	2		
15			92	67	24					1
16			22	15	7					
17			5	3	2					
18			14	1		11	2			
19			6	2		2				2
20			9	4	1	2				2
21			3			3				
22			16	1		7	1			7
23			6			5				1
24			67	43	20					4
25			5			5				
26			1	1						
27			4						4	
28			1		1					
29			39	23	13	1	2			
30			38	26	12					
31			75	46	29					
32			68	35	32				1	
33			2	1					1	
34			1	1						
35			1			1				
36			39	22	17					
37			5	3					2	
38			5	3	2					
39			3	3						
40			18			12		6		
41			5			5				
42			2	1	1					
43			2	2						
44			5	1	1				3	
45			3	3						
46			2			2				
47			2			2				
48			4	3	1					
50			14	8	4					2
51			2			1		1		
52			34			32				2
53			1			1				
54			2	1						1
55			1	1						
Total Caribou			**1178**	**459**	**252**	**386**	**12**	**14**	**11**	**44**

ILGATCHUZ MOUNTAINS CARIBOU SURVEY - JUNE 21, 2002

Sighting	Easting	Northing	Total	Cows	Calves	Bulls	Yrlg. Cows	Yrlg. Bulls	Unclass. Adults	Unclass. Yrlg.
1			3	2	1					
2			1	1						
3			67	43	21					3
4			3	2	1					
5			2	2						
6			5			5				
7			3			3				
8			22			19		3		
9			7			7				
10			2			2				
11			25			18		7		
12			14	1	1				8	4
13			1			1				
14			20			15		3	2	
15			14			13		1		
16			8			7			1	
17			1			1				
18			8	1		6				1
19			1			1				
20			3	1		2				
21			43	10		27				6
22			3	2		1				
23			5			1			4	
24			45	5		39				1
25			12	8		3				1
26			22	14	7					1
27			100	67	33					
28			69	38	31					
29			14	7	6					1
30			7	5	1					1
31			5			3		1		1
32			1	1						
33			114	77	37					
34			38	21	17					
35			2	1	1					
36			8	4	4					
37			3	2	1					
40			8	4	4					
41			45	25	20					
42			11	7	4					
43			5	2	2					1
44			9	2		5		1		1
45			53	16	3	32				2
46			3			3				
47			1			1				
48			3			3				
53			23	12	11					
56			4			4				
59			55	38	17					
60			354	225	129					
61			23	2		14				7
62			10	1		7				2
63			3	2	1					
64			22	12	10					
66			2	1	1					
67			45	23	21					1

ILGATCHUZ MOUNTAINS CARIBOU SURVEY - JUNE 21, 2002

Sighting	Easting	Northing	Total	Cows	Calves	Bulls	Yrlg. Cows	Yrlg. Bulls	Unclass. Adults	Unclass. Yrlg.
69			1	1						
71			223	146	77					
72			2	1	1					
73			8	4	4					
74			13	7	6					
75			42	30	12					
76			15	9	6					
Total Caribou			**1684**	**885**	**491**	**243**	**0**	**16**	**15**	**34**

	Total	Cows	Calves	Bulls	Yrlg. Cows	Yrlg. Bulls	Unclass. Adults	Unclass. Yrlg.
Total Caribou for the Itcha Mountains								
	1178	**459**	**252**	**386**	**12**	**14**	**11**	**44**
Total Caribou for the Ilgachuz Mountains								
	1684	**885**	**491**	**243**	**0**	**16**	**15**	**34**
Total Caribou for the Itcha and Ilgachuz Mountains								
	2862	**1344**	**743**	**629**	**12**	**30**	**26**	**78**

Appendix 3. Mountain Goat and California Bighorn Sheep observations during Post-Calving Survey, June 20th and 21st, 2002.

MOUNTAIN GOAT SIGHTINGS

MOUNTAIN GOATS: ITCHA MOUNTAINS, JUNE 20, 2002

Sighting	Easting	Northing	Total	Adults	Kids	Yearlings	Yrlg. Cows	Unclassifed
49			16	12	2	2		
Total Mountain Goats			**16**	**12**	**2**	**2**	**0**	**0**

MOUNTAIN GOATS: ILGATCHUZ MOUNTAINS, JUNE 21, 2002

Sighting	Easting	Northing	Total	Adults	Kids	Yearlings	Yrlg. Cows	Unclassifed
38			2	2				
39			2	2				
49			1	1				
51			2	1	1			
52			1	1				
54			13				13	
55			1				1	
57			2	1	1			3
58			1	1				
65			31	23	5	3		
68			4	4				7
70			4	4				
77			4	3	1			
Total Mountain Goats			**68**	**43**	**8**	**3**	**14**	**10**

	Total	Adults	Kids	Yearlings	Yrlg. Cows	Unclassifed
Total Mountain Goats for the Itcha Mountains						
	16	**12**	**2**	**2**	**0**	**0**
Total Mountain Goats for the Ilgachuz Mountains						
	68	**43**	**8**	**3**	**14**	**10**
Total Mountain Goats for the Itcha and Ilgachuz Mountains						
	84	**55**	**10**	**5**	**14**	**10**

CALIFORNIA BIGHORN SHEEP SIGHTINGS

CALIFORNIA BIGHORN SHEEP: ILGATCHUZ MOUNTAINS, JUNE 21, 2002

Sighting	Easting	Northing	Total	Rams	Ewes	Lambs	Unclassifed
50			3	2	1		

Appendix 4. Summary of observed caribou in Post-Calving surveys of the Itcha-Ilgachuz Mountains, 1978-2002.

Year	Date	Total	Cows	Calves	Bulls	Yearling Cows	Yearling Bulls	Unsexed Adults	Unsexed Yearling	Unclassified
1978	Jun-01	110	13	5						92
1979	Jun-08	262	45	45						172
1980		240								240
1981										
1982	Jun-16	711	395	197	119[2]					
1983	Jun-22	710		186				524		
1984	Jul-07	775		187	107			481		
1985	Jun-18	985	675	255	55					
1986	Jun-25	929	605	267	57					
1987	Jun-18	933	597	258	78					
1988	Jul-26	670	461	161	48					
1989	Jun-23	1175	672	314	132			44		
1990	Jun-27	1215	682	330	183			16	4	
1991	Jul-12	1408		298	16			1094		
1992	Jun-17	1194	569	317	219			41	48	
1993										
1994	Jun-21	1136	618	293	123				102	
1995	Jun-21	1321	609	428	201	52	31			
1996	Jun-27/29	1327	606	334	202	68	98		19	
1997	Jun-20	1689	794	444	203	81	83	37	47	
1998	Jun-20	2121	1012	557	322	4	34	50	142	
1999	Jul-13/14	1754	882	385	278	13	25	72	99	
2000	Jun-20/21	2167	1111	673	265	37	58	12	11	
2001	Jun-20	2051	912	564	302	42	68	132	31	
2002	Jun-20/21	2862	1344	743	629	12	30	26	78	

[2] Includes some yearlings

Appendix 5. Summary of observed caribou cow numbers and calculated cow survey estimates with 95% confidence intervals for Post-Calving surveys, 1985-2002. Survey cow estimates derived from the Joint Hypergeometric Estimator.

YEAR	OBSERVED COWS	ESTIMATED COWS	LOWER LIMIT	UPPER LIMIT
1985	675	797	695	1128
1986	604	939	709	1570
1987	597	970	712	1709
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996	606	978	756	1484
1997	794	887	810	1116
1998	1012	1281	1090	1751
1999	882	1141	969	1533
2000	1111	1555	1271	2199
2001	912	1155	983	1578
2002	1344	1568	1380	2162